

selecting a cell that comprises a minichromosome that is about 10 Mb to about 50 Mb that comprises a neo-centromere, the nucleic acid and euchromatin;

transferring the minichromosome into a second cell, wherein the second cell is an animal cell;

introducing the cell comprising the minichromosome into a female non-human mammal; and

allowing the cell introduced into the female animal to develop into a transgenic non-human mammal comprising a minichromosome; wherein, the nucleic acid comprises DNA encoding a selectable marker and a gene product or products; and

the DNA encoding the selectable marker and the DNA encoding the gene product or products are introduced into the cell simultaneously or separately.

44. A method of producing a transgenic non-human mammal, comprising:

introducing a nucleic acid fragment into a cell, wherein the nucleic acid fragment comprises a selectable marker;

growing the cell under selective conditions to produce cells that have incorporated the nucleic acid fragment into their genomic DNA;

selecting a cell that comprises a minichromosome that is about 10 Mb to about 50 Mb that comprises a neocentromere, the selectable marker and euchromatin;

introducing into the cell DNA encoding a gene product or products;

growing the cell under selective conditions, whereby cells comprising minichromosomes comprising the DNA encoding the gene product(s) are produced;

isolating the minichromosome and introducing it into an animal cell;

introducing the cell comprising the minichromosome into a female non-human mammal; and

D<sup>2</sup>  
allowing the cell introduced into the female mammal to develop into a transgenic non-human mammal comprising a minichromosome.

D<sup>3</sup>  
71. The method of claim 43, wherein the animal cell is a mouse embryonic stem cell or a fertilized ovum.

73. A method for producing a transgenic non-human mammal, comprising:  
introducing DNA encoding a gene product or products into a cell containing the minichromosome of cell line EC3/7C5;  
growing the cell under selective conditions, whereby cells comprising minichromosomes comprising the DNA encoding the gene product(s) are produced;  
isolating the minichromosome and introducing it into an animal cell;  
introducing the cell comprising the minichromosome into a female non-human mammal; and

D<sup>4</sup>  
allowing the cell introduced into the female mammal to develop into a transgenic non-human mammal comprising a minichromosome.

74. A method for producing a transgenic non-human mammal, comprising:  
introducing DNA encoding a gene product or products into a cell containing the  $\lambda$  neo-chromosome of cell line KE1 2/4;  
growing the cell under selective conditions, whereby cells comprising the  $\lambda$  neo-chromosome comprising the DNA encoding the gene product(s) are produced;  
isolating the  $\lambda$  neo-chromosome and introducing it into an animal cell;  
introducing the cell comprising the minichromosome into a female non-human mammal; and  
allowing the cell introduced into the female mammal to develop into a transgenic non-human mammal comprising a minichromosome.

D<sup>5</sup>

93. A method of producing a transgenic non-human mammal, comprising:

- introducing nucleic acid comprising a selectable marker into a first cell;
- growing the cell under conditions that selectively permit the growth of cells containing the nucleic acid;
- selecting a cell comprising a satellite artificial chromosome;
- transferring the satellite artificial chromosome into a second cell, wherein the second cell is an animal cell;
- introducing the second cell comprising the satellite artificial chromosome into a female non-human mammal; and
- allowing the cell to develop into a transgenic non-human mammal comprising a satellite artificial chromosome.

D<sup>6</sup>

95. A method of producing a transgenic non-human mammal, comprising:

- introducing nucleic acid comprising a selectable marker into a first cell;
- growing the cell under conditions that selectively permit the growth of cells containing the nucleic acid;
- selecting a cell comprising a dicentric chromosome that comprises a *de novo* centromere;
- growing the cell under conditions whereby a satellite artificial chromosome is produced;
- transferring the satellite artificial chromosome into a second cell, wherein the second cell is an animal cell;
- introducing the second cell comprising the satellite artificial chromosome into a female non-human mammal; and
- allowing the cell to develop into a transgenic non-human mammal comprising a satellite artificial chromosome.

D<sup>6</sup>

96. A method of producing a transgenic non-human mammal, comprising:

introducing nucleic acid comprising a selectable marker into a first cell;  
growing the cell under conditions that selectively permit the growth of  
cells containing the nucleic acid;

selecting a cell comprising an artificial chromosome that comprises more  
heterochromatic nucleic acid than euchromatic nucleic acid;

transferring the artificial chromosome into a second cell, wherein the  
second cell is an animal cell;

introducing the second cell comprising the artificial chromosome into a  
female non-human mammal; and

allowing the cell to develop into a transgenic non-human mammal  
comprising an artificial chromosome that comprises more heterochromatic than  
euchromatic nucleic acid.

97. A method for producing a transgenic non-human mammal,  
comprising:

introducing an embryo comprising a satellite artificial chromosome into a  
female non-human mammal; and

allowing the embryo to develop into a transgenic non-human mammal  
comprising a satellite artificial chromosome.

98. A method for producing a transgenic non-human mammal,  
comprising:

introducing a fertilized oocyte comprising a satellite artificial chromosome  
into a female non-human mammal; and

allowing the embryo to develop into a transgenic non-human mammal  
comprising a satellite artificial chromosome.

99. A method for producing a transgenic non-human mammal,  
comprising:

introducing a mouse embryonic stem cell comprising a satellite artificial  
chromosome into an embryo;

introducing the embryo into a female non-human mammal; and